Alg. 2 Warm Up #11-4

Solve using the quadratic formula:
(answer exact and simplified)

1. $3x^2 - 6x - 2 = 0$

2. $3x^2 - 6x + 2 = 0$

Solve using the quadratic formula:
(answer exact and simplified)

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a = 3 \quad b = -6 \quad c = -2$

1. $3x^2 - 6x - 2 = 0$

$x = \frac{6 \pm \sqrt{36 - 4(3)(-2)}}{2(3)}$

$x = \frac{6 \pm \sqrt{60}}{6}$

$x = \frac{6}{6} \pm \frac{\sqrt{\cancel{4}}^{\,2}\sqrt{15}}{\cancel{6}\,3}$

$\boxed{x = 1 \pm \frac{\sqrt{15}}{3}}$

2. $3x^2 - 6x + 2 = 0$

$x = \frac{6 \pm \sqrt{36 - 4(3)(2)}}{6}$

$x = \frac{6 \pm \sqrt{12}}{6}$

$x = \frac{6 \pm 2\sqrt{3}}{6}$

$x = \frac{6}{6} \pm \frac{2\sqrt{3}}{6}$

$\boxed{x = 1 \pm \frac{\sqrt{3}}{3}}$

HW Questions:

12-6. Factor each of the following expressions.

a. $x^2 - 4$ 　　 b. $y^2 - 81$

c. $1 - x^2$ 　　 d. $1 - \sin^2(x)$

$(1 - x)(1 + x)$ 　　 $(1 + \sin x)(1 - \sin x)$

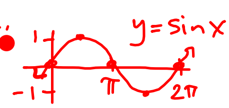
$a^2 - b^2$

$(a + b)(a - b)$

12-10. Consider the function $f(x) = 3\sin(x + \frac{\pi}{2}) - 4$.

a. How is its graph different from $f(x) = \sin(x)$?

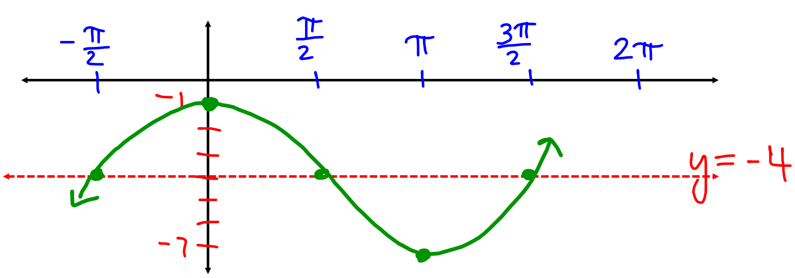
b. Sketch the graph. $\rightarrow$ Per $= 2\pi$, parent:



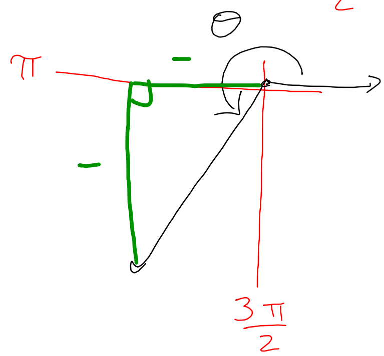
a. vertical stretch of 3 ---> Amp = 3,

down 4 ---> line of oscillation is $y = -4$, left $\frac{\pi}{2}$

b.



15) $\pi \le \theta \le \frac{3\pi}{2}$



a) $\sin\theta$ $-$

b) $\cos\theta$ $-$

c) $\tan\theta = \frac{\sin\theta \; -}{\cos\theta \; -}$ $+$

d) $\frac{1}{\cos\theta}$ $-$

12-29. For each of the following equations, find the solutions that lie in the domain $0 \le x \le 2\pi$.

a. $2\sin(x) - 1 = 0$
$\quad\quad\quad\quad +1 \;\; +1$

b. $2\cos(x) = -\sqrt{3}$

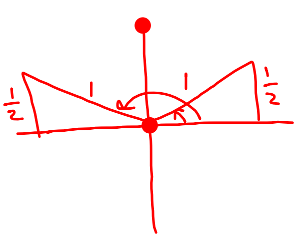
c. $2\sin(x) = \sqrt{2}$

d. $\cos(x) = 1$

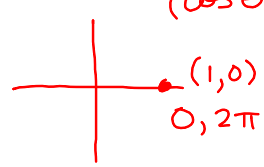
$\frac{2\sin x}{2} = \frac{1}{2}$

$\sin x = \frac{1}{2}$

$x = \frac{\pi}{6}, \frac{5\pi}{6}$



(x, y)
$(\cos\theta, \sin\theta)$



$x = 0, 2\pi$

$\sin x = \frac{\sqrt{2}}{2}$

$x = \frac{\pi}{4}, \frac{3\pi}{4}$

12-33. Simplify, then add $\frac{x-2}{x+2}+\frac{2x-6}{x^2-x-6}$. Justify each step.

$$\frac{x-2}{x+2} + \frac{2\cancel{(x-3)}}{(x+2)\cancel{(x-3)}}$$

$$\frac{x-2+2}{x+2}$$

$$\boxed{\frac{x}{x+2}}$$

12-42. For each of the following problems, find all of the solutions without using a calculator. Draw a graph or unit circle to support your answers. Then predict the solution that your calculator will give and use your calculator to check your prediction.

a. $2\cos(x)-1=0$

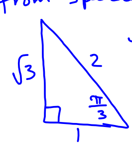
b. $\tan(x)=\sqrt{3}$

c. $2\sin(x)=\sqrt{3}$

d. $4\sin^2(x)-3=0$

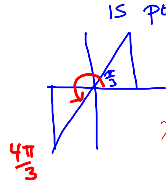
b) $x=\tan^{-1}(\sqrt{3})$

from special Δ:



$\tan\frac{\pi}{3}=\sqrt{3}$

so look where else on the unit circle tangent is positive.



$x=\frac{\pi}{3}, \frac{4\pi}{3}$

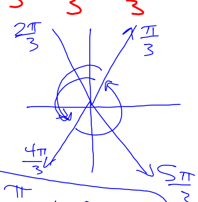
$$\boxed{x=\frac{\pi}{3}+\pi n}$$

$$\frac{\cancel{4}\sin^2 x}{\cancel{4}}=\frac{3}{4}$$

$$\sqrt{\sin^2 x}=\pm\sqrt{\frac{3}{4}}$$

$$\sin x=\pm\frac{\sqrt{3}}{2}$$

$$x=\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$



$$\boxed{\begin{array}{l} x=\frac{\pi}{3}+\pi n \\ x=\frac{2\pi}{3}+\pi n \end{array}}$$

12-45. Solve each equation. Check for extraneous solutions.

a. $\sqrt{x+7}=x+1$

$x=-3,2$

but..

Check

$\sqrt{-3+7}\stackrel{?}{=}-3+1$

$\sqrt{4}\stackrel{?}{=}-2$

$2\neq-2$

So -3 is extraneous.

$\boxed{\text{Answer: } x=2}$

b. $\frac{2}{x+3}-\frac{1}{x}=\frac{-6}{x^2+3x}$

LCD $= x(x+3)$ Clear denom.

$x(x+3)\left(\frac{2}{x+3}-\frac{1}{x}\right)=\frac{-6}{\cancel{x(x+3)}}\cdot\cancel{x(x+3)}$

$\frac{x\cancel{(x+3)}}{1}\cdot\frac{2}{\cancel{(x+3)}}-\frac{1}{\cancel{x}}\cdot\frac{\cancel{x}(x+3)}{1}=-6$

$2x-(x+3)=-6$

$x=-3$

but.. " denom $=0$

So No Solution

What degree is each polynomial? x-intercepts?

$P_1(x)=(x-2)(x+5)^2$ parent $y=x^3$

$P_2(x)=2(x-2)(x+2)(x-3)$ $y=x^3$

$P_3(x)=x^4-21x^2+20$ $y=x^4$

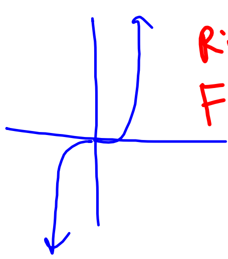
$P_4(x)=(x+3)^2(x+1)(x-1)(x-5)$ $y=x^5$

repeat

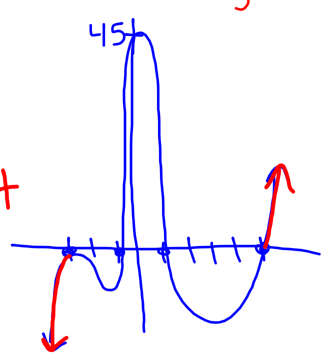
$y=x^4$

$y=x^4$

$y=x^5$



Rises Rt Falls left



So just touches @ $x=-3$

Describing end behavior:

Even degree, both sides do the same thing.

Odd degree, one side goes up and the other down.

Ex: $f(x) = 3x^3 - 2x^2 + 7$

Rises Rt: as $x \to \infty$; $f(x) \to \infty$

Falls left: as $x \to -\infty$; $f(x) \to -\infty$

When a > 0, right side goes up.

When a < 0 there has been a reflection in the x-axis and the right side goes down.

Solve on $(0, 2\pi]$

1) $1 - \sin^2\theta = 0$

$(1+\sin\theta)(1-\sin\theta) = 0$

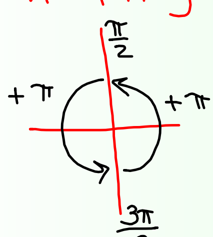
$1+\sin\theta = 0 \qquad 1-\sin\theta = 0$

$\sin\theta = -1 \qquad \sin\theta = 1$

$\boxed{\theta = \frac{3\pi}{2} \qquad \theta = \frac{\pi}{2}}$

General Solution:

Let n = integer



$\boxed{\theta = \frac{\pi}{2} + \pi n}$

2) $2\sin^2\theta - 3\sin\theta + 1 = 0$

Let $y = \sin\theta$

$2y^2 - 3y + 1 = 0$

$(2y-1)(y-1) = 0$

$(2\sin\theta - 1)(\sin\theta - 1) = 0$

$2\sin\theta - 1 = 0 \qquad \sin\theta - 1 = 0$

$\frac{2\sin\theta}{2} = \frac{1}{2} \qquad \sin\theta = 1$

$\sin\theta = \frac{1}{2}$

$\boxed{\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{\pi}{2}}$

HW: 12 - # 18-20, 22,
43, 46, 53, 56

and 8 - #8, 88-90